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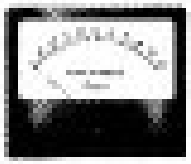

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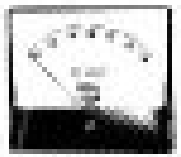

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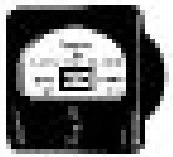


OPERATOR'S MANUAL

VACUUM TUBE VOLTMETER
MODEL 311-2

SIMPSON ELECTRIC COMPANY

5200 W. Kinzie St., Chicago, Illinois 60644
Area Code 312, Telephone 379-1121
In Canada, Bach-Simpson, Ltd., London, Ontario

Printed in U.S.A.

FIG. 1 (REF.)
SIMPSON 260 SERIES 5 PORTABLE VOLT-OHM-MILLIAMMETER WITH CASE

SECTION I

GENERAL DESCRIPTION

INTRODUCTION

The Simpson Vacuum Tube Voltmeter Model 313-2 has been designed to provide an advanced type of measuring instrument having the ability to measure voltages without any serious loading effects. This instrument has been enclosed in a durable metal case for safety and convenience, and also to prevent leakage. All the connections and controls are located conveniently, on the front of the instrument. The large meter on the front panel provides easy reading and accurate indications for all of its applications.

Every operation and indicating convenience has been included in this compact instrument. The controls on the front panel are limited to include only those which are necessary for operation. They include one range switch, one function switch, and two balancing controls.

Meter scale markings include both R.M.S. and peak-to-peak indications for AC and RF voltage measurements. While the R.M.S. scale is applicable only to pure sinusoidal input signals, the instrument indicates correctly the peak-to-peak values for all alternating waveform inputs.

The high input impedance (11 megohms for DC) reduces circuit loading effects to less than any of the previous models of portable Vacuum Tube Voltmeters. The compact and convenient metal case, with the large easy-to-read meter, makes this the most efficient and practical Vacuum Tube Voltmeter available. Conforming to the latest engineering developments, most of the component parts in the Model 313-2 are mounted on a printed circuit board. This simplifies assembly and reduces maintenance, resulting in a lower cost assembly while retaining Simpson quality components.

Two test leads are furnished with the Model 311-S. One terminates on the instrument end in a banana plug, which fits into the front panel jack marked GROUND. The other end of this lead has a reversible clip, covered with an insulator, with which the lead can be connected to the reference point in the circuit being measured. The second lead has a connector which fits on the input connector of the front panel. The other end of this lead has a probe with a standard pointed tip. A switch in the probe body sets up a direct connection for either AC/DC-RMS readings, or connects an isolating resistor into the circuit for DC readings.

The Simpson Vacuum Tube Voltmeter Model 311-S is supplied with a 3-wire AC line cord and plug requiring 105 to 130 volts, 50 or 60 cycles AC power. Power consumption is 5 watts.

Since the third wire from the cord is connected to the metal case, caution should be exercised in making any measurement in respect to line voltage.

In addition to the external AC power, there is a self-contained 1.5 volt battery which is used for resistance measurements.

Accessories Available

High Frequency Probe Simpson Part No. 0474

14 Kilocycles to 250 Megacycles

DC High Voltage Probe Simpson Part No. 0532

0-30/300 volts DC

For more information on these accessory probes, see Page 22.

SPECIFICATIONS

RANGES AND INPUT IMPEDANCES

D. C. VOLTAGE MEASUREMENTS

Ranges 0 to 3/15/30/150/300/1500 volts

Input resistance is 22 megohms for all ranges.

A. C. VOLTAGE MEASUREMENTS

All indications on the black meter are R. M. S. values based on a pure sine wave input signal. Ranges 0 to 3/15/30/150/300/1500 volts R. M. S.

Indications on the red arcs are peak-to-peak values.

0 to 8/40/80/400/800/4000 volts peak-to-peak.

Input impedance is 2.2 megohms minimum at 60 cycles.

OHMMETER MEASUREMENTS

Ranges	Center Scale Values
RX1	30 ohms
RX10	300 ohms
RX100	3000 ohms
RX1K	30K ohms
RX10K	0.3 megohm
RX100K	3 megohms
RX1M	30 megohms

D. C. GALVANOMETER

Zero center D. C. voltage measurements are possible for any range using the lowest scale arc. This is normally used for such applications as FM discriminator alignment. (See Operating Instructions, Page 19.)

ACCURACY

With an external power within the range of 105 volts to 130 volts, 60 cycles AC, furnished to operate the instrument, accuracy is ± 3% of full scale for DC voltages, ± 5% of full scale for AC voltages, and ± 5 degrees of arc for resistance measurements.

FREQUENCY RESPONSE

The 2.5/5/10 and 50 volt ranges are within ± 3% from 30 cps. to 1 Megacycle, the 250 volt range to 500 KC and the 500 volt range ± 10% to 300 KC. Typical frequency response characteristics for the model 311-2 are given in Fig. 2.

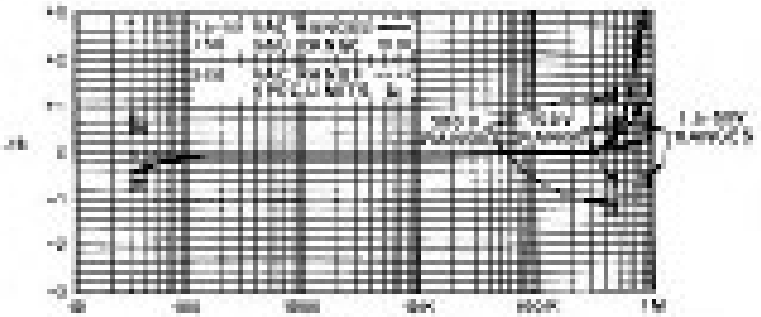


FIGURE 2 TYPICAL FREQUENCY RESPONSE CURVES

DIMENSIONS & WEIGHT

The case dimensions of the Simpson Vacuum Tube Voltmeter Model 311-2 are 7-1/2 inches high by 5-3/8 inches wide by 4-1/2 inches deep. Its weight is 4-1/2 pounds. Shipping weight is 6 pounds.

FRONT PANEL CONTROLS

CIRCUIT SELECTOR SWITCH

When the circuit selector switch is in the OFF position, power is current off. Turning this switch to the right turns on power

which is indicated by the pilot light located on the front panel centered between the ground jack and input connector.

This switch also selects the circuit to be used. Two positions, marked — DC and + DC connect the meter circuit for measuring DC volts and act as a meter reversing switch. With the ground lead connected to the chassis or the common circuit connection, set the switch at + DC for measuring positive voltage or at — DC for measuring negative voltage. When the switch is set at AC, meter circuits are connected for AC voltage measurements. The internal peak-to-peak vacuum tube rectifier changes the incoming AC voltage into a proportional DC voltage to be measured with the meter circuits. When the switch is set at OHMS, an internal battery and the associated resistors are switched into the meter circuit to provide for resistance measurements.

RANGE SELECTOR SWITCH

The range switch selects the desired range for the circuit which has been connected with the circuit selector switch. There are seven positions; each position is marked for full scale voltage indication for either DC or AC (R.M.S.) voltage measurements and is also marked with the multiplier factor to be used when measuring resistances.

ZERO ADJUST (ELECTRICAL)

After the power has been turned on and the circuit selector switch has been set for any of its on positions, the knob marked ZERO ADJUST should be turned either to the right or the left until the meter pointer rests over the zero marker at the left side of the scale. Connect the probe and ground lead together while making this adjustment. It may be necessary to readjust for zero when changing ranges or functions.

If an appreciable shift occurs when changing between the AC to DC functions, correction can be accomplished as follows:

1. Switch to the 1.5 VDC range and adjust the zero adjust knob for zero indication.
2. Switch to 15 VAC and adjust R-32 for zero indication. (R-32 can be accessed using a small screwdriver inserted in the hole located on the left side of the case under the lower edge of the handle).

OHMS ADJUST

With the circuit selector switch set at OHMS, separate the test leads. The pointer should move across the meter scale and rest near the right end of the scale. Turn the OHMS ADJUST knob until the pointer is directly over the mark at the right of the scale.

CIRCUIT CONNECTORS

A ground jack is provided in the lower left hand corner and is used with the ground lead provided with the tester.

A male connector is provided in the lower right hand corner and is used with the AC/OHM —DC probe provided with the tester.

SECTION II

OPERATING INSTRUCTIONS

CAUTION

WHENMEASURING HIGH VOLTAGES, FIRST TURN OFF POWER IN THE CIRCUIT TO BE MEASURED AND DISCHARGE ALL CAPACITORS. CONNECT THE PROBES TO THE CIRCUIT AND THEN TURN ON CIRCUIT POWER. DO NOT TOUCH PROBES OR LEADS WHILE POWER IS ON. TURN OFF POWER AND DISCHARGE CAPACITORS BEFORE PROBES ARE DISCONNECTED OR MOVED.

METER ZERO ADJUSTMENT (MECHANICAL)

Before turning on power in the Model 311-2, be sure that the meter pointer rests on zero. If the pointer is off zero, adjust it by means of the slotted screw located in the meter cover just below the scale. Use a small screwdriver to turn this adjustment slowly right or left until the pointer rests directly over the zero marks at the left of the scale.

MEASURING DC VOLTAGES 0-1000 VOLTS

1. Set the circuit selector switch to the — DC or + DC position, depending on the polarity of the voltage to be measured.
2. Rotate the range switch to select the full scale range desired. While the Model 311-2 circuits will not be easily damaged, it is best to set the range switch for a higher range than needed as a protection to the instrument. After the first reading, set the range switch for a lower range if necessary to provide a more accurate reading.
3. Turn off power in the circuit to be measured and discharge all capacitors.
4. Connect the ground clip of the GROUND test lead to the reference point for the voltage to be measured.
5. Set the switch in the probe body at DC. Connect the probe tip to the point to be measured.
6. Turn on power in the circuit being measured and observe the meter. If the meter pointer deflects to the left, circuit polarity is opposite to that for which the circuit selector switch is set; set the circuit selector switch for the correct polarity.
7. Read the meter scale indication at the pointer position on one of the black arcs. For the 1.5/15/150 and 1500 volt ranges, use the arc marked 0 to 15. For the 5/50 and 500 volt ranges, use the arc marked 5 to 50.
8. Turn off circuit power and discharge capacitors before removing the probes.

NOTE
To measure more than 1400 volts DC, see information on high voltage accessory probe on Page 23.

ZERO CENTER DC VOLTAGES

1. Set circuit selector switch at either – DC or + DC. Set the switch on the probe handle at DC and short the test leads together.
2. Rotate the ZERO ADJUST knob until the meter pointer rests over the zero center marker on the lower scale arc.
3. Set the range selector switch to a range which is at least twice the probable circuit voltage. Connect the test leads to the circuit the same as for DC voltage measurements.
4. Observe the meter pointer indication on the lowest arc marked 50-0-50. If the circuit selector switch is set at – DC, positive voltages will be indicated above the center mark; negative voltages will be indicated to the left. Each side of the scale represents one half of the range being used.

The purpose for which the zero center scale is used generally do not require an accurate measurement of the values of voltages, but merely an indication of a balanced condition. An example is alignment of an FM discriminator; the desired balanced condition will result in a zero center indication, while a misaligned condition will cause some deflection away from the zero center.

MEASURING AC VOLTAGES

1. Set the circuit selector switch to the AC position.
2. Set the range switch to the desired range position.
3. Turn off power to the circuit to be measured and discharge all the capacitors.
4. Connect the clip for the GROUND test lead to the chassis or reference point in the circuit to be measured.
5. Set the switch on the probe body at AC/OHMS. Connect the probe tip to the point in the circuit where voltage is to be measured.

6. Turn on power in the circuit to be measured. Observe the meter pointer. The pointer indicates voltages on two arcs for AC measurements – R. M. S. and peak-to-peak. Both values apply when the input wavevoltage being measured is a sine wave. Only the peak-to-peak value is correct when the input wavevoltage is not a sine wave.

Range Switch Position	Read R. M. S. Voltages On	Read Peak-To-Peak Voltages On
1.5V	Black Arc Marked 0-1.5 Low AC Volts	Red Arc Marked 0-4 Below 0-1.5V Arc
5V	Black Arc Marked 0-5 Low AC volts	Red Arc Marked 0-14 Below 0-5V Arc
15V	Black Arc 0-1.5 (x10)	Red Arc 0-4 (x10)
50V	Black Arc 0-50	Red Arc 0-140
150V	Black Arc 0-1.5 (x100)	Red Arc 0-4 (x100)
500V	Black Arc 0-50 (x10)	Red Arc 0-140 (x10)
1600V	Black Arc 0-1.5 (x1000)	Red Arc 0-4 (x1000)

7. Turn off circuit power and discharge capacitors before removing probe and ground connection.

RESISTANCE MEASUREMENTS

1. Set the circuit selector switch in the OHMS position.
2. Rotate the range selector switch to any desired range.
3. Set the switch on the probe body at AC/OHMS.
4. Short the AC/OHMS probe and the common test clip together and check the meter pointer for a zero indication. If necessary, rotate the ZERO ADJUST control to obtain a zero indication.
5. Separate the AC/OHMS probe and common test lead. The meter pointer should deflect to full scale. Set the OHMS ADJUST control for exactly full scale deflection. When the pointer cannot be brought up to full scale, the battery inside the case needs replacement; see information in Section III, Maintenance.

6. Be sure no voltage is present in the circuit in which resistance is to be measured. Turn off circuit power and discharge all capacitors.
7. Connect the AC/OHMS probe and the common test clip to the two points between which DC resistance is to be measured.
8. Read the arc marked OHMS at the pointer position. Multiply the reading by the value indicated at the range switch position. K stands for 1000. M stands for 1,000,000. The result will be resistance in ohms.

SECTION III

MAINTENANCE

CARE OF INSTRUMENT

The Simpson Vacuum Tube Voltmeter Model 311-2 is a durable and rugged instrument which will withstand the wear and tear of every day use. But it should be protected from rough treatment, dropping, or other unnecessary severe shock; the panel meter has delicate jewel-mounted parts which will be damaged under these conditions. With proper care, the Model 311-2 should provide many years of excellent operation.

REMOVAL FROM CASE

To remove the instrument from its case to replace the battery or to inspect and service its internal parts, remove one screw from the back of the case and two screws at the bottom of the case. Slide the front panel straight forward out of the case. All of the internal parts including the line cord are attached to the front panel and will come out of the case as a complete unit.

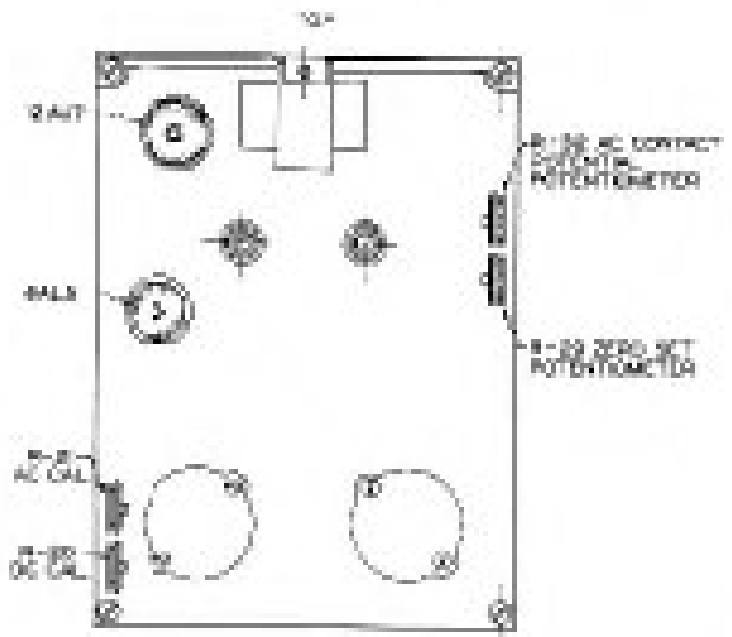
BATTERY REPLACEMENT

The 1.5 volt dry cell battery inside the case of the Model 311-2 is used as a voltage source for ohmmeter operation. When the meter pointer cannot be brought up to full scale deflection with the OHMS ADJUST control with test probes separated and the function switch at OHMS, replace the battery with a fresh equivalent. This is a size C flashlight type cell. Open the case by screws and observe the polarity of the old battery in its clamp mounting. Observe this polarity when you mount the new battery in the clamp.

CALIBRATION

The Simpson Vacuum Tube Voltmeter Model 311-2 has been calibrated carefully at the factory, and changes should not be necessary. After a long period of use, or when any internal parts have been replaced, recalibration may be required. Use the following procedure:

1. Allow the instrument to warm up for a period of at least one hour. Set the function switch at - DC and the range switch at 1.5V.
2. Turn the ZERO ADJUST knob to the extreme left and note the position of the meter pointer. Return meter pointer to zero. Turn the function switch at + DC and turn the ZERO ADJUST knob to the extreme right. Note the meter pointer position again. The pointer positions should be the same for both polarities. If there is any difference between them, adjust potentiometer R22 until the readings are the same. See figure 8, to help locate potentiometer R22 inside the instrument.
3. With the function switch at – DC, the switch on the probe body at DC, connect the probe and ground lead together and set the ZERO ADJUST control for a zero pointer indication.
4. Turn the function switch to AC and set the switch on the probe body at AC. If the pointer does not rest at zero,



R21 TOP

FIGURE 3. LOCATION OF POTENTIOMETERS

adjust potentiometer R21 to correct it. See figure 3 to help locate potentiometer R21 inside the instrument.

5. Turn the function switch to - DC and set the switch on the probe body to DC again. Connect the probe and ground lead to a known value of DC voltage. Check the meter indication. If it is not correct, adjust potentiometer R20 to calibrate the instrument. See figure 3, to help locate potentiometer R20 inside the instrument.
6. Turn the function switch to AC and set the switch on the probe body to AC again. Connect the probe & ground lead to a known value of AC voltage. Check the meter indication.

If it is not correct, adjust potentiometer R21 to calibrate the instrument. See figure 3, to help locate potentiometer R21 inside the instrument.

TUBES AND REPLACEMENT

Two tubes are used in the Model 311-3. One is a type 6AL5 used as a peak-to-peak rectifier for all AC voltages. The other is a type 12AU7, which operates in the bridge circuit for all measurements. See Fig. 1 for location.

When it is necessary to replace the type 12AU7 tube, the new tube must be aged for at least 48 hours to eliminate its transient characteristics before the instrument is recalibrated. Place this new tube in the socket and turn on power for the instrument. Leave the instrument connected and operating for the 48-hour aging period. Then recalibrate it with the six steps shown under CALIBRATION.

REPLACEMENT OF RESISTORS, CAPACITORS, ETC.

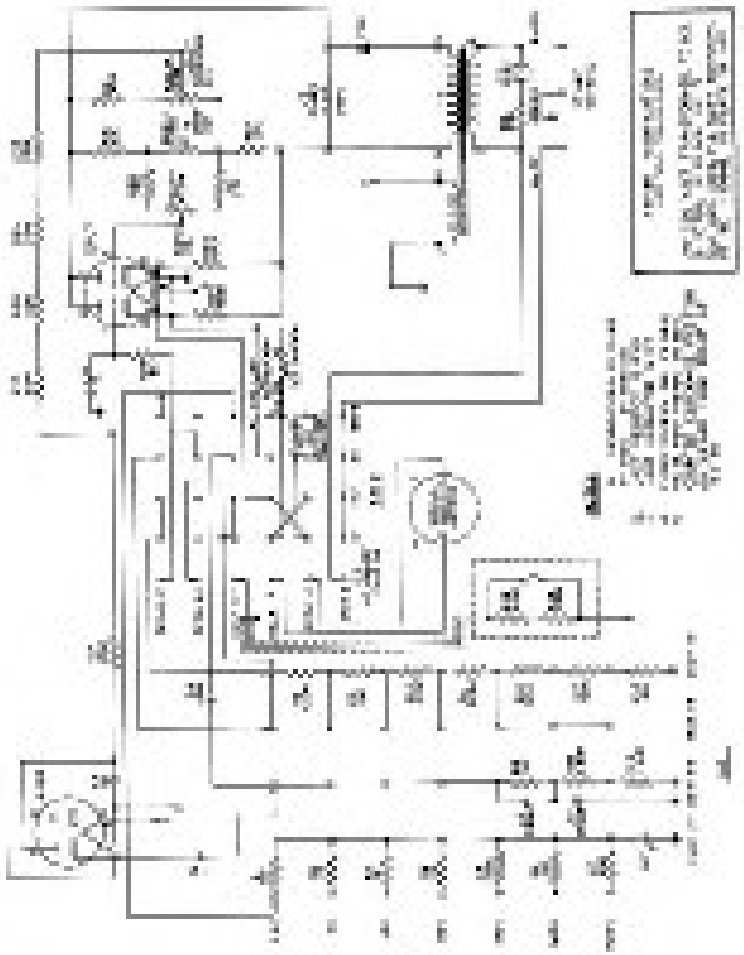
Most of these parts in the Model 311-3 are mounted on the printed circuit board. When replacement is necessary, first obtain an exact equivalent part; then clip the defective part off the printed circuit board, leaving its leads to use as connections for the replacement. Carefully twist the leads of the replacement around those leads which were left in the board, and solder each connection. Trim away all excess wire and check to see that there are no short circuits to other parts mounted nearby.

OBTAINING REPLACEMENT PARTS

When any replacement parts are required, use the following parts list and order the necessary parts from Simpson Electric Company, 5200 W. Kinzie St., Chicago, Illinois 60644. Specify the Simpson Part Number and the description for each part in your order.

PARTS LIST

Reference Symbol	Description	Simpson Part No.
BT	Battery 1.5 volts Size C cell	1-111801
C1	Capacitor .1µf 400 volts, Paper Molded	1-110325
C2	Capacitor .05µf 400 volts, Paper Tubular	1-113896
C3	Capacitor .005µf 1000 volts, Paper Molded	1-110329
C4	Capacitor .01µf 500 volts, Molded Mica	1-114971
C5	Capacitor 80µf 150 volts, Electrolytic	1-110319
C6	Capacitor 20µf 300 volts, Molded Mica	1-110875
C7	Capacitor 80µf 300 volts, Molded Mica	1-110838
CR-1	Diode Rectifier 750 ma.	1-117840
R1	Resistor 8.7Ω ±½% Bobbin	10-870279
R2	Resistor 108 Ω ±1% ½ watt	1-110851
R3	Resistor 1K ±1% ½ watt	1-117858
R4	Resistor 10K ±1% ½ watt	1-117870
R5	Resistor 100K ±2% ½ watt	1-117860
R6	Resistor 1 meg. ±1% ½ watt	1-117861
R7	Resistor 10 meg. ±1% ½ watt	1-113454
R8	Resistor 16.5 meg. ±1% ½ watt	1-110728
R9	Resistor 9 meg. ±1% ½ watt	1-113455
R10	Resistor 1.05 meg. ±1% ½ watt	1-113680
R11	Resistor 100K ±2% ½ watt	1-110879
R12	Resistor 165K ±1% ½ watt	1-110725
R13	Resistor 28K ±1% ½ watt	1-113826
R14	Resistor 15K ±1% ½ watt	1-110726
R15	Resistor 5.00 meg. ±1% 1 watt	1-110721
R16	Resistor 1.45 meg. ±1% ½ watt	1-110970
R17	Resistor 28 meg. ±1% 1 watt	1-110728



PARTS LIST (cont'd.)

Reference Symbol	Description	Simpson Part No.
R18	Resistor 50K ±10% ½ watt	1-113945
R19	Potentiometer 10K ±20%	2-130737
R20	Potentiometer 5K ±20%	2-130738
R21	Potentiometer 6K ±20%	2-130739
R22	Resistor 1 meg. ±1% ½ watt	1-110701
R23	Resistor 300K ±10% ½ watt	1-113949
R24	Resistor 300K ±10% ½ watt	1-113949
R25	Potentiometer 1K ±20%	2-130719
R26	Resistor 270 Ω ±10% ½ watt	1-113896
R27	Resistor 270 Ω ±10% ½ watt	1-113896
R28	Resistor 12K ±10% ½ watt	1-113908
R29	Potentiometer 1K ±20%	2-130719
R30	Resistor 18K ±10% ½ watt	1-113671
R31	Resistor 620K ±10% ½ watt	1-113950
R32	Potentiometer 5K ±20%	2-130733
R33	Resistor 3.58 meg. ±1% 1 watt	2-110722
R34	Resistor 22 meg. ±10% ½ watt	1-110651
R35	Resistor 22 meg. ±10% ½ watt	1-110654
R36	Resistor 22 meg. ±10% ½ watt	1-110654
R37	Resistor 22 meg. ±10% ½ watt	1-110654
R38	Resistor 3.8 meg. ±1% ½ watt	1-117924
R39	Resistor 3.8 meg. ±1% ½ watt	1-117924
T1	Power Transformer	5-110705
V1	Tube type 6AL5 aged	5-811896
V2	Tube type 12AU7 aged	5-810744
	Knobs black 3/8" dia.	5-110701
	Knobs black 1½" dia.	5-110707
	Meter Movement	35-AU2511-2
	DC/AC Voltage Test Probe	10-682504
	Ground Lead	10-682563
	Case with handle	10-681224
L1	Pilot light, clear, with wire clip	5-110710

SECTION IV

APPLICATIONS

The extremely high input resistance of the Simpson Vacuum Tube Voltmeter Model 311-2 permits it to be used in many applications where a voltmeter with lower resistance would result in excessive circuit loading. The following suggestions show only a few sample uses for which it will be found to be a superior instrument.

MEASURING PLATE VOLTAGES

Lower resistance voltmeters will reduce a plate voltage when it is measured, especially when there is a high resistance plate load. Such voltages will be measured accurately with the Model 311-2 because its high input impedance for all ranges will reduce this loading interference.

PHASE INVERTER BALANCE

The two sections of a push-pull circuit may be checked for balance with the Model 311-2. With a signal generator connected to the amplifier input, measure the plate and grid voltages and compare them at such similar circuit points.

MEASURING STAGE GAIN

The Model 311-2 is an ideal instrument for measuring amplifier stage gain. Apply the output of a signal generator to the amplifier input, and measure and compare the input and output signal for each stage. The ratio of voltage between the output and the input represents the stage gain. When the Model 311-2 is set to measure AC voltages, a series capacitor, C3, blocks any DC present and prevents it from interfering with the readings.

AVC VOLTAGE

The use of the Simpson Volt-Ohmmeter Model 311-2 to measure A.V.C. voltages is possible due to the high input resistance of the DC voltage circuit which has little or no noticeable loading effect on such a circuit. Connecting the Model 311-2 across the A.V.C. network is often more convenient than using an output meter for alignment purposes, as the volume control may be set at its minimum position. It is not necessary to disconnect the A.V.C. to prevent its interfering with the alignment procedure.

MEASURING GRID VOLTAGES

The high input resistance of the Model 311-2 makes it possible to measure voltage between the control grid and cathode of a tube without any serious loading effect. The operation of a local oscillator may be checked throughout its tuning range: when it is oscillating, a small voltage is present and when it stops oscillating there is no voltage between the grid and the cathode.

MEASURING BIAS VOLTAGES

Bias voltages are usually small. The ranges of the Model 311-2 permit accurate measurement of bias, even when it is only a fraction of one volt, without loading interference.

DISCRIMINATOR ADJUSTMENT

The zero center scale on the dial of the Model 311-2 permits easy adjustment of a discriminator stage. With the input connected across the discriminator load resistors and the instrument set up for zero center DC voltage operation, discriminator balance will be shown when the meter pointer is at the zero center mark. Any unbalance in the discriminator will cause the pointer to be deflected to the right or to the left of the zero center mark.

FM ALIGNMENT

By connecting the Model 311-2 across the first limiter grid leak resistor, a reading will be obtained for FM alignment purposes. Adjust the circuits for a maximum indication. Follow the receiver manufacturer's instructions for the exact procedure as it applies to his particular receiver.

COUPLING AND BY-PASS CAPACITORS

A coupling capacitor or a bypass capacitor normally will present a low impedance for AC at the frequencies which it is designed to handle. To identify an open capacitor in either of these applications, measure the AC voltage at each side of the capacitor in the circuit when a normal frequency is applied through the circuit; a good capacitor will show almost as much voltage at its output as is present at its input. An open capacitor will show a normal or high input voltage, but little or no output voltage.

To identify a shorted capacitor, isolate it from the circuit by unsoldering either one of its leads. Then set the Model 311-2 for OHMS measurements on a low range and measure the resistance across the capacitor. If the meter shows a drop towards zero when the probes are first connected to the capacitor, and then rises towards the high end of the scale, wait until the pointer comes to rest to read the resistance across the capacitor. This condition is normal, and the amount of such action will be determined by a combination of the amount of capacity and the ohmmeter range used. If the capacitor is shorted, the meter will not show a charging condition and will usually indicate a very low or zero ohms reading.

SIGNAL TRACING

The Model 311-2 is very useful for signal tracing or for examining a radio circuit at various points in audio or radio frequency circuits. Its necessary low capacity, high frequency probe permits its use in high frequency circuits which are present in FM and TV receivers.

SECTION V

ACCESSORY PROBES

HIGH FREQUENCY PROBE

GENERAL DESCRIPTION

Frequency Response ..... 30KC to 250 MC within 1DB

Probe Input Capacitance ..... 3.0 pf

Voltage Range ..... 40 volts rms (maximum)
100 volts peak-to-peak (maximum)

Probe Accuracy ..... 3.0% of full scale

Reading ..... RMS or P-P value of sine wave

Maximum Input ..... Input capacitor rated at 500 volts peak

The High Frequency Probe, part number 0474, for the Simpson Model 311-2 is designed primarily to measure voltages at frequencies above the range of the regular AC/OHMS-DC probe furnished with the meter. The cable terminates with the same type of connecting plug.

The crystal diode contained within the probe body rectifies the voltage under test, charging the 600 pf capacitor proportional to the positive peak value. This direct current is then fed through the 15 Meg. resistor and into the DC input of the instrument circuit where it is read directly on the meter scale in RMS or P-P value.

It is important to note that the probe circuit works as a peak detector and responds only to the positive peak value of the signal under test.

OPERATING INSTRUCTIONS

Connect the cable plug on the end of the Probe cord to the Model 311-2 VTVM Input connector. Set the circuit selector switch on Model 311-2 to – DC, and the range switch to the desired range. Connect the probe's ground lead crocodile clip to ground adjacent to the point of measurement, and touch the tip of the probe to the point being measured.

Read either RMS or P-P scale on the Model 311-2 VTVM for the corresponding desired range, while checking sine wave amplitudes. When checking the signals of nonsinusoidal wave shapes convert meter reading to positive peak reading by dividing the reading on P-P scale by 2.

HIGH DC VOLTAGE PROBE

DESCRIPTION

Accessory probe, part number 0510, is available for use in high DC voltage measurements. It has a multiplier resistor in the probe body which will increase total input resistance to 5000 megohms. Basic instrument ranges will be increased to 100 times the value marked on the front panel.

OPERATION

Disconnect the probe and ground lead from the instrument. Connect the accessory high voltage probe to the input connector; it has a special ground lead which is connected to the instrument automatically. Proceed as for ordinary DC voltage measurements, with ranges equal to 100 times the range switch position markings.

Accessory Probes

RANGE SWITCH POSITION	INSTRUMENT RANGE WITH ACCESSORY 10-V PROBE
15 V	0-150 volts DC
50 V	0-500 volts DC
150 V	0-1,500 volts DC
500 V	*0-30,000 volts DC

*Full range indication would be 50,000 volts; maximum allowable voltage for safe operation is 30,000 volts.

WARNING

Do not apply more than 30,000 volts to the circuit of the High Voltage Probe and the Model 381-2; greater voltages may short out the input circuits and cause irreparable damage to both the probe and the instrument.

SIMPSON WARRANTY REPAIR STATIONS AND PARTS DEPOTS

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Meter-master Electric
3930 E. Jenkins Road
Area Code 080
272-7228

California, Glendale 91201
Bob Bankerday Company
6917 San Fernando Road
Area Code 213
849-6197

California, Los Angeles 90022
Meter-master Los Angeles
Division of Kierulff Elec., Inc.
2585 E. Washington Blvd.
Area Code 213
685-5400

California, Los Angeles 90007
Quality Electric
Division of Kierulff Elec., Inc.
2700 South Broadway
Area Code 213
232-2061

California, Mountain View 94041
Kierulff Microwave
3969 Middlefield Road
Area Code 415
961-6292

California, San Diego 92111
Meter-master San Diego
8107 Raphael Road
Area Code 714
279-2561

California, San Francisco 94124
Pacific Electrical Instrument Lab.
111 Hale Street
Area Code 415
431-5150

Canada, London, Ontario
Bach-Simpson Ltd.
1255 Dyndas Street
P.O. Box 491
Area Code 519
451-8600

Colorado, Denver 80205
Meter-master Instrument Corporation
748 So. Broadway
Area Code 303
778-1920

Connecticut, Middletown
Merrill Company
Randolph Road - PO Box 457
Area Code 203
Diamond 7-2628

Connecticut, New Haven 06511 Kinetics Instrument Labs Inc. 530 Howell Avenue	Area Code 203 776 7304
Florida Miami 33138 Florida Precision Instrument Corp. 880 N.W. 79th Avenue	Area Code 305 836-1551
Florida Orlando 32805 Electro Tech Inc. 307 - 27th Street	Area Code 305 855-3580
Georgia Naperville 30301 Electro Tools Inc. 3000 Commerce Way	Area Code 404 749-1200
Hawaii Honolulu 96817 Electronic Systems Inc. 1575-10 Kilea Street	951-473 853-332
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Illinois, Chicago 60644 Pacific Indicator Company 3000 W. Madison Street	Area Code 312 261-1700
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Louisiana, New Orleans 70115 Industrial Instrument Works 2000 Tchoupitoulas Street	Area Code 504 895-3011
Maryland, Baltimore 20705 Meter Devices Inc. 1185 Maryland Ave.	Area Code 301 945-7755
Maryland, Tennessee 21087 Electric Instrument Labs. Inc. 103 Pool Tennessee Road	Area Code 301 803 1300
Massachusetts, Burlington 01803 The Hardy Co. Middlesex Turnpike at "A" St.	Area Code 617 272-8150
Massachusetts, Needham Heights 02194 Instruments, Incorporated 370 Hillside Avenue	Area Code 617 444-8418
Michigan, Detroit 48228 Hans Meyer, Inc. 1300 Hilton Road Dearborn	Area Code 313 347-3080
Minnesota, Minneapolis 55421 Instrumentation Services Inc. 837 Bryant Ave Avenue	Area Code 612 521-8085
Missouri, St. Louis 63112 Schuster Instruments 5445 Delmar Blvd.	Area Code 314 367-9090
New Jersey, Belford 07109 Marshall Instruments, Inc. 200 Washington Avenue	Area Code 201 531-1150
New York, Buffalo 14240 Electrical Instrument Labs. 920 Hertel Avenue	Area Code 716 875-0980
N. Y., Great Neck, Long Island 11022 Simpson Instrument Sales & Service, Inc. 120 Garden Hill Road	Area Code 212 895-0874 Area Code 516 482-0150
New York, Great Neck, L.I. 11022 A & M Instrument, Inc. Community Drive	Area Code 516 487 0300
New York, New York 10021 Electro Tools Replacement Company 60 Tenth Avenue	Area Code 212 929 0380
New York, Syracuse 13212 Syracuse Instrument Lab. 8858 South Avenue Box 88	Area Code 315 492-1801
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